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Early Pleistocene climate in western arid central Asia inferred from loess-palaeosol sequences

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Abstract

Arid central Asia (ACA) is one of the most arid regions in the mid-latitudes and one of the main potential dust sources for the northern hemisphere. The lack of in situ early Pleistocene loess/dust records from ACA hinders our comprehensive understanding of the spatio-temporal record of aeolian loess accumulation and long term climatic changes in Asia as a whole. Here, we report the results of sedimentological, chronological and climatic studies of early Pleistocene loess-palaeosol sequences (LPS) from the northeastern Iranian Golestan Province (NIGP) in the western part of ACA. Our results reveal that: 1) Accumulation of loess on the NIGP commenced at ~2.4-1.8 Ma, making it the oldest loess known so far in western ACA; 2) the climate during the early Pleistocene in the NIGP was semi-arid, but wetter, warmer, and less windy than during the late Pleistocene and present interglacial; 3) orbital-scale palaeoclimatic changes in ACA during the early Pleistoceneare in-phase with those of monsoonal Asia, a relationship which was probably related to the growth and decay of northern hemisphere ice sheets.

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